Liverpool John Moores University

Title:	APPLIED MECHANICS
Status:	Definitive
Code:	**5041ENG** (105779)
Version Start Date:	01-08-2011
Owning School/Faculty:	Engineering
Teaching School/Faculty:	Engineering

Team	Leader
Keith Metcalfe	Y

Academic Level:	FHEQ5	**Credit Value:**	24.00	**Total Delivered Hours:**	69.00
Total Learning Hours:	240	**Private Study:**	171		

Delivery Options
Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	40.000
Practical	6.000
Tutorial	20.000

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS1	Examination	60.0	3.00
Essay	AS2	Coursework: 4 laboratory assignments	20.0	
Essay	AS3	Coursework: 4 tutorial assignments	20.0	

Aims

To provide the means for solving many basic engineering problems by learning the principles of mechanics for rigid and deformable solid bodies.

Learning Outcomes

After completing the module the student should be able to:

1 Apply stress/strain transformation in two dimensions to practical engineering problems.
2 Predict failure of materials and structures under load.
3 Determine stress distribution in material elements under static loading, bending and torsion.
4 Solve problems involving mechanical vibrations and damping.
5 Solve problems of non-linear motion involving mechanisms.
6 Apply the principles of balancing to rotating machine elements.
7 Derive and solve differential equations characterising dynamic systems using a variety of modern techniques
8 Use SIMULINK to build and simulate differential equations as transfer functions or integration simulations

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

EXAM	1	2	3	4	5	6	7	8
CW	1	4	5	6				
CW	1	2	3	4	5	6		

Outline Syllabus

Elasticity of a continuum - practical uses of 2D stress and strain transformations.
Beam deflection and twist in torsion elements.
Modes of failure - application of yield criteria to elements under combined loading.
Fatigue - S-N curves, factors affecting endurance limit.
Elastic instability, practical examples.
Shear in beams and torsionally loaded thin sections.
Mechanical vibrations. Free and forced vibrations. Effect of damping. Force transmissibility and vibration isolation. Suspension systems.

Nonlinear motion transmission. Instant centres. Velocity and acceleration diagrams for planar linkages.

Balancing of rotating machine elements.

Modelling of mechanical, thermal and electrical systems to create governing differential equations.
Laplace methods for solving differntial equations.
Integration methods to solve differential equations.
Simulation methods using SIMULINK.
Intoduction to closed loop control.

Learning Activities

Lectures, private study, tutorials and laboratory experiments.

References

Course Material	Book
Author	Uicker, J J, Pennock, G R, Shigley, J E
Publishing Year	2003
Title	Theory of machines and mechanisms
Subtitle	
Edition	
Publisher	Oxford University Press
ISBN	0-19-515598

Course Material	Book
Author	Norton, R L
Publishing Year	2003
Title	Design of machinery
Subtitle	
Edition	
Publisher	McGraw Hill
ISBN	0071215778

Course Material	Book
Author	Popov
Publishing Year	1998
Title	Engineering Mechanics of Solids
Subtitle	
Edition	2nd
Publisher	Prentice Hall
ISBN	0137261594

Course Material	Book
Author	Ogata, K.
Publishing Year	1992
Title	System Dynamics
Subtitle	
Edition	
Publisher	Prentice Hall
ISBN	0 13 880428 1

Notes

The module extends previous studies in mechanics by examining more applied problems, which relate to real mechanical systems. It helps to strengthen the student's knowledge for successful mechanical design.